



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/028,433	12/28/2001	Young-Sang Byun	3430-0175P	4398
2292 7590 05/30/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER DUONG, THOI V				
ART UNIT 2871		PAPER NUMBER		
NOTIFICATION DATE 05/30/2008		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

### Office Action Summary

**Application No.**

10/028,433

**Applicant(s)**

BYUN ET AL.

**Examiner**

THOI V. DUONG

**Art Unit**

2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 April 2008.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,4,7-10 and 12-24 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,2,4,7-10 and 12-24 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SI-08)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 27, 2008 has been entered.

Accordingly, claims 1 and 9 were amended, and claims 3, 5, 6 and 11 were cancelled. Currently, claims 1, 2, 4, 7-10 and 12-24 are pending in this application.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 and 9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "wherein the liquid crystal material is emitted from the projecting portion substantially in the same direction as the resonator vibrates" was not described in the specification. As shown in Fig. 3 of the instant invention, the specification only describes that the projecting portion 126 is

Art Unit: 2871

disposed under the resonating plate 124 and emits the liquid crystal 114 due to the vibration of the resonating plate 124 which can vibrate with the same frequency as the resonator 122 (paragraphs 36 and 37). The specification does not disclose the direction of the vibration of the resonator 122.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not sure in what direction the resonator vibrates such that the liquid crystal material is emitted from the projection portion substantially in the same direction as the resonator vibrates because the specification does not describe this subject matter.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2, 4, 9, 10 and 12-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Guffeld et al. (von Guffeld, USPN 6,055,035) in view of D. E. Damouth (USPN 3,512,173).

Re claim 1, as shown in Figs. 2A, 2B and 3, von Guffeld discloses a method of forming a liquid crystal layer on a substrate, comprising:

preparing a liquid crystal material in a projecting portion 20 comprising a nozzle fixture 21 and a LC source 23;

applying a pressure to the projecting portion 21 so as to emit the liquid crystal material (col. 5, lines 11-65);

moving the substrate 1A in one direction (col. 6, lines 8-14); and  
depositing the liquid crystal material from the projection portion 20 uniformly onto the substrate during the moving of the substrate in the one direction (col. 5, lines 30-37).

Re claim 9, as shown in Figs. 1, 2A, 2B and 3, von Gutfeld discloses an apparatus for forming a liquid crystal layer on a substrate, comprising:  
a projecting portion 20 having a nozzle plate 21 containing a nozzle aperture 22 for emitting a liquid crystal material; and

a stage 1 for moving the substrate 1A in one direction during emitting of the liquid crystal material from the projecting portion 21 uniformly onto the substrate (col. 5, 30-37 and col. 6, lines 8-14).

Von Gutfeld discloses a method of forming a liquid crystal layer on a substrate that is basically the same as that recited in claims 1 and 9 except for a resonator for applying an on voltage during emitting of the liquid crystal material to generate a vibration with only a specific frequency by the resonator so as to apply a pressure to the projecting portion to emit the liquid crystal material from the projection portion; and a resonating plate placed between the resonator and the projecting portion and outside of the projecting portion, wherein the generated vibration is transmitted from the resonator

to the projecting portion through the resonating plate such that the resonating plate vibrates with the same specific frequency.

As shown in Fig. 1, Damouth discloses an ink-jet system comprising: a resonating plate 18 (mechanical structure) located between a resonator 17 (piezoelectric crystal) and a projecting portion 10 (conduit) and outside of the projecting portion, wherein an on voltage is applied to the resonator 39 during emitting of the liquid material 15 to generate a vibration with only a specific frequency by the resonator 17 so as to apply a pressure to the projecting portion 10 to emit the liquid material 15 from the projecting portion 10, wherein the generated vibration is transmitted from the resonator 10 to the projecting portion 10 through the resonating plate 18 such that the resonating plate vibrates with the same specific frequency (col. 2, lines 3-50).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of forming a liquid crystal layer on a substrate of von Gutfeld with the teaching of Damouth by employing a resonator and a resonating plate placed between the resonator and the projecting portion and outside of the projecting portion for generating a vibration with only a specific frequency upon application of an on voltage during emitting of the liquid crystal material so as to apply a pressure to the projecting portion to emit the liquid crystal material from the projecting portion, wherein the generated vibration is transmitted from the resonator to the projecting portion through the resonating plate such that the resonating plate vibrates with the same specific frequency in order to effectively control size and break-up rate of the emitting material stream to produce the uniform droplets (col. 2, lines 46-50).

Re claims 2 and 10, as shown in Fig. 2A, von Gutfeld discloses that the projecting portion 20 has a nozzle plate 21 (fixture) containing a plurality of orifices 22, said nozzle plate adjusting the applied pressure for emitting the liquid crystal material, the liquid crystal material being emitted through the plurality of orifices (col. 5, lines 30-58 and col. 7, lines 47-55).

Re claims 4 and 13, von Gutfeld discloses that the liquid crystal material is emitted and deposited in a vacuum chamber 60 (Figs. 6 and 7, and col. 7, lines 36-55); accordingly, it is obvious that the vacuum chamber encompasses the projection portion, the resonator and the resonating plate used to emit the liquid crystal material.

Re claims 15 and 16, as shown in Figs. 2B and 3 of von Gutfeld, the volume of the emitted liquid crystal material is adjusted by a CPU 25 to obtain the correct a correct amount of the liquid crystal material deposited on the panel 1A according to a position of the nozzle plate 21 or the moving substrate (col. 5, line 50 through col. 6, line 14). Accordingly, it is obvious that the CPU 25 is operated by an on voltage according to a position of the nozzle plate 21 or the moving substrate so as to allow a uniform amount of the liquid crystal material to be ejected through the nozzle plate (col. 5, line 50 through col. 6, line 14).

Re claim 12, as shown in Fig. 3, since von Gutfeld discloses that the stage 1 is moved in relation to a fixed projection portion 20 (col. 6, lines 8-14), it is obvious that means is provided for moving the stage.

Re claim 14, Damouth discloses that means 16 (potential source) is provided for generating vibration in the resonator 17 (col. 2, lines 42-46).

Re claims 17 and 19, Damouth discloses that the liquid material is emitted from the projecting portion by only the pressure applied to the projecting portion (col. 2, lines 3-16).

Re claims 18 and 20, Damouth discloses that the liquid material is emitted from the projecting portion by the pressure applied to the projecting portion without applying an electric field to the liquid material during emitting of the liquid material (col. 2, lines 3-50).

Re claims 21 and 23, as shown in Fig. 1, Damouth discloses that the resonating plate 18 is placed between the resonator 17 and the projecting portion 10 such that a first surface (left surface) of the resonating plate 18 is in contact with the resonator 17 and a second surface (right surface) of the resonating plate 18 is in contact with an upper surface (left surface) of the projecting portion 10,

wherein, re claims 22 and 24, as shown in Fig. 1, the resonating plate 18, is spaced apart from the liquid material 15 by the projecting portion 10.

8. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over von Gutfeld et al. (von Gutfeld, USPN 6,055,035) in view of D. E. Damouth (USPN 3,512,173) as applied to claims 1, 2, 4, 9, 10 and 12-24 above, and further in view of Masazumi et al. (Masazumi, USPN 6,331,884 B1).

As shown in Fig. 4, von Gutfeld discloses at least one of the substrates, 1A or 1B, having a sealed pattern 41 (col. 7, lines 24-27). However, von Gutfeld as modified in view of Damouth does not disclose a black matrix formed under the sealed pattern,



Art Unit: 2871

wherein the liquid crystal material start and stop is deposited on the black matrix as recited in claims 7 and 8.

As shown in Fig. 5, Masazumi discloses a black matrix 8 (black light absorbing layer) formed under a sealed pattern 9b' (col. 16, lines 18-23), wherein a liquid crystal material 9a, 9a', 9a" start and stop is deposited on the black matrix.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of von Gutfeld with the teaching of Masazumi by formed a black matrix under a sealed pattern for enabling display of a black which is background color when the liquid crystal is transparent (col. 10, lines 1-10).

### ***Response to Arguments***

9. Applicant's arguments with respect to claims 1 and 9 filed on March 27, 2008 have been fully considered but they are not persuasive.

Applicant argued that Damouth fails to teach "the liquid crystal material is emitted from the projecting portion substantially in the same direction as the resonator vibrates" since Damouth discloses that a piezoelectric crystal 17 (resonator) is directly connected at approximately right angles to a plate 18 horizontally vibrates, that is, the droplet is emitted from a nozzle 12 perpendicular to the direction of the vibration of the piezoelectric crystal 17. The Examiner disagrees with Applicant's remarks since the Damouth does not disclose the direction of the vibration of the piezoelectric 17. Damouth only discloses that the vibration of the piezoelectric crystal 17 relates a mechanical stress at the same frequency rate to the plate 18 which is directly connected

Art Unit: 2871

to the nozzle 12 and causes vibration thereof at the transmitted frequency to produce the uniform droplets 22 (col. 2, lines 39-50). Also, the specification of the instant invention does not disclose the direction of the vibration of the resonator 122 such that the liquid crystal material is emitted from the projecting portion substantially in the same direction as the resonator vibrates. As shown in Fig. 3, the specification only describes that the projecting portion 126 is disposed under the resonating plate 124 and emits the liquid crystal 114 due to the vibration of the resonating plate 124 which can vibrate with the same frequency as the resonator 122 (paragraphs 36 and 37).

For the above reasons, the claims are still not allowable over the cited references.

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms, can be reached at (571) 272-1787.

/Thoi V. Duong/ - Primary Examiner

May 26, 2008